

IN THE CLAIMS:

1. (original) A sub-network connection system, comprising:

line modules configured to receive bridged traffic signals over individual corresponding channels, said line modules being grouped into sets at a lower protection layer, said sets of line modules being organized into working legs and protection legs at an upper protection layer, wherein said line modules are activated/deactivated based on different upper and lower protection schemes associated with said upper and lower protection layers;

state maps associated with each of said line modules, said state maps storing state data that activates and deactivates said line modules, said state maps being updated in accordance with said lower protection scheme to perform intra-leg switching between said line modules in one of said working and protection legs, said state map being updated in accordance with said upper protection scheme to perform inter-leg switching between a first line module in one of said working and protection legs and a second line module in another of said working and protection legs; and

a network control module interconnected with said line modules, said network control module performing inter-leg switching by updating said state data in said state maps for corresponding line modules in associated working and protection legs.

2. (original) The sub-network connection system of claim 1, wherein said line modules constitute I/O boards and said network control module performs a switch operation between a working I/O board in said working leg and a working I/O board in said protection leg when a defect is experienced in said traffic signal.

3. (original) The sub-network connection system of claim 1, wherein said lower and upper protection schemes constitute a 1+1 protection scheme and a sub-network connection protection scheme.

4. (original) The sub-network connection system of claim 1, wherein said upper and lower protection schemes constitute a 1:N equipment protection scheme and a sub-network connection protection scheme.

5. (original) The sub-network connection system of claim 1, wherein said lower protection scheme constitutes one of a 1+1 protection scheme, a 1:N equipment protection scheme and a UPSR protection scheme.

6. (original) The sub-network connection system of claim 1, wherein each of said state maps is stored in memory on an associated one of said line modules.

7. (original) The sub-network connection system of claim 1, further comprising a single cell switch fabric containing said network control module.

8. (original) The sub-network connection system of claim 1, further comprising a multi-cell switch fabric containing multiple switch fabrics separate and remote from said network control module.

9. (original) The sub-network connection system of claim 1, wherein said line modules generate a lower layer state map based on one of 1+1, UPSR and 1:N protection schemes and said network control module generates an upper layer state map based on an SNC protection scheme, corresponding said upper and lower state maps being logically combined to create said state maps.

10. (original) The sub-network connection system of claim 1, wherein said state maps are stored on one of said network control module and corresponding said line modules.

11. (original) The sub-network connection system of claim 1, wherein said line modules perform intra-leg switching by updating said state maps for corresponding line modules all in a common single working leg.

12. (original) The sub-network connection system of claim 1, wherein said line modules are housed within one of a cross-connect and add/drop multiplexer and support one of uni-directional and bi-directional switching.

13. (original) The sub-network connection system of claim 1, wherein the line modules constitute a non-SONET/mixed mode combination.

14. (original) The sub-network connection system of claim 1, wherein a first line module operates in a VT mode and a second line module operates in a DS1 mode.

15. (original) A method for protection switching in a sub-network connection, comprising:

receiving traffic signals at line modules that are grouped into sets, where said sets of line modules are organized into working legs and protection legs;

storing state data in state maps associated with each of said line modules;

inter-leg switching between a first line module in one of said working and protection legs and a second line module in another of said working and protection legs by updating said state maps in accordance with an inter-leg protection scheme; and

activating and deactivating said line modules based on updates to said state maps.

16. (original) The method of claim 15, further comprising intra-leg switching between said line modules in one of said working and protection legs by updating said state maps in accordance with an intra-leg protection scheme.

17. (original) The method of claim 16, wherein said intra-leg protection scheme is one of 1+1 protection, 1:N protection, and UPSR protection.

18. (original) The method of claim 15, wherein said inter-leg protection scheme is SNC protection.

19. (original) The method of claim 15, wherein said state maps are stored in memory on corresponding line modules.

20. (original) The method of claim 15, further comprising generating separate intra-leg and inter-leg state maps and logically combining said intra-leg and inter-leg state maps to create said state maps associated with each of said line modules.

21. (original) The method of claim 15, further comprising monitoring said traffic signals for defects and performing said inter-leg switching when a defect is detected.

22. (original) The method of claim 15, further comprising monitoring said traffic signals for defects and updating fault information when a defect is detected.

23. (original) The method of claim 15, further comprising monitoring said traffic signals for defects and, when a defect is detected, determine whether an intra-leg protection scheme exists.

24. (original) The method of claim 15, further comprising identifying an intra-leg protection scheme before performing said inter-leg switching.

25. (original) The method of claim 15, wherein the line modules constitute a non-SONET/mixed mode combination.

26. (original) The method of claim 15, wherein a first line module operates in a VT mode and a second line module operates in a DS1 mode.

27. (new) The sub-network connection system of claim 1, wherein said network control module performing inter-leg switching based on said upper protection scheme by updating said state data in said state maps for corresponding line modules in associated working and protection legs, said line modules performing intra-leg switching based on said lower protection scheme by updating said state data in said state maps.